

WE CLAIM:

1. An ultrasound transducer, comprising:
 - a housing;
 - a transducer module mounted in said housing, said transducer module operable to transmit ultrasonic energy; and
 - an electronics assembly located in said housing and coupled with said transducer and characterized by an interior portion and an exterior portion, said electronics assembly including:
 - at least one electronics sub-assembly having at least one discrete electrical component affixed thereto and located in said interior portion; and
 - a first thermal conductor thermally coupled with said at least one discrete electrical component and operable to remove heat generated by said at least one discrete electrical component and move said heat from said interior portion to said exterior portion.
2. The ultrasound transducer of Claim 1, further comprising a second thermal conductor coupled with said first thermal conductor and located proximate to said exterior portion and operative to remove said heat from said first thermal conductor.
3. The ultrasound transducer of Claim 2, wherein said second thermal conductor further comprises a thermoelectric cooler.
4. The ultrasound transducer of Claim 3, wherein said thermoelectric cooler comprises a Peltier device.
5. The ultrasound transducer of Claim 2, wherein said second thermal conductor is coupled with said transducer module and further operative to remove heat generated by said transducer module.
6. The ultrasound transducer of Claim 5, wherein said second thermal conductor is coupled with said transducer module by a solid thermal conductor.

7. The ultrasound transducer of Claim 5, wherein said second thermal conductor is coupled with said transducer module by a liquid thermal conductor.
8. The ultrasound transducer of Claim 1, wherein said first thermal conductor further comprises at least one thermally conductive sheet disposed over said at least one discrete component and extending from said interior portion to said exterior portion of said electronics assembly.
9. The ultrasound transducer of Claim 8, wherein said at least one thermally conductive sheet is coupled with at least one other thermally conductive sheet and a second thermal conductor by a thermally conductive connector.
10. The ultrasound transducer of Claim 1, wherein said at least one electronics sub-assembly further comprises a printed circuit board, said printed circuit board comprising said first thermal conductor.
11. The ultrasound transducer of Claim 1, wherein said first thermal conductor comprises at least one heat pipe.
12. The ultrasound transducer of Claim 1, wherein said first thermal conductor comprises a liquid cooling loop.
13. The ultrasound transducer of Claim 12, wherein said at least one electronics sub-assembly further comprises a printed circuit board, said liquid cooling loop being embedded in said printed circuit board.
14. The ultrasound transducer of Claim 1, wherein said housing further comprises a transducer portion housing said transducer module and an electronics portion housing said electronics assembly, said housing further comprising a thermal separator operative to thermally isolate said transducer portion from said electronics portion.
15. The ultrasound transducer of Claim 14, wherein said thermal separator comprises a thermoelectric cooler, said thermoelectric cooler having a cold side located in said transducer portion and operative to remove heat from said transducer, and a hot side located in said electronics portion.

16. The ultrasound transducer of Claim 1, wherein said transducer module comprises a micro-mechanical based transducer.
17. A method of cooling an ultrasound transducer, said ultrasound transducer comprising a housing, a transducer module mounted in said housing and an electronics assembly located in said housing and characterized by an interior portion and an exterior portion, said electronics assembly including at least one electronics sub-assembly having at least one discrete electrical component affixed thereto and located in said interior portion, said method comprising:
 - generating heat by said at least one electrical component;
 - removing said heat from said interior portion to said exterior portion using a first thermal conductor thermally coupled with said at least one electrical component.
18. The method of Claim 17, wherein said removing said heat from said first thermal conductor further comprises actively conducting said heat away from said first thermal conductor using a thermoelectric cooler.
19. The method of Claim 17, further comprising disposing at least one thermally conductive sheet over said at least one discrete component and extending said at least one thermally conductive sheet from said interior portion to said exterior portion of said electronics assembly.
20. The method of Claim 17, wherein said electronics sub-assembly comprises a printed circuit board coupled with said at least one discrete electrical component, said method further comprising embedding said first thermal conductor in said printed circuit board.
21. The method of Claim 17, wherein said first thermal conductor comprises at least one heat pipe.
22. The method of Claim 17, wherein said first thermal conductor comprises a liquid cooling loop.

23. The method of Claim 22, wherein said at least one electronics sub-assembly further comprises a printed circuit board, said liquid cooling loop being embedded in said printed circuit board.
24. The method of Claim 16 further comprising:
 - removing said heat from said first thermal conductor by a second thermal conductor located proximate to said exterior portion and coupled with said first thermal conductor.
25. The method of Claim 24, wherein said second thermal conductor is further coupled with said transducer module, said method further comprising removing heat generated by said transducer module by said second thermal conductor.
26. The method of Claim 25, wherein said second thermal conductor is coupled with said transducer module by a solid thermal conductor.
27. The method of Claim 25, wherein said second thermal conductor is coupled with said transducer module by a liquid thermal conductor.
28. The method of Claim 17, wherein said housing further comprises a transducer portion housing said transducer module and an electronics portion housing said electronics assembly, said method further comprising thermally isolating said transducer portion from said electronics portion.
29. The method of Claim 28, further comprising thermally isolating said transducer portion from said electronics portion using a thermoelectric cooler, said thermoelectric cooler having a cold side located in said transducer portion and operative to remove heat from said transducer, and a hot side located in said electronics portion.
30. An ultrasound transducer comprising:
 - a housing;
 - a transducer module mounted in said housing; and
 - an electronics assembly located in said housing and characterized by an interior portion and an exterior portion, said electronics assembly including at least

one electronics sub-assembly having at least one discrete electrical component affixed thereto and located in said interior portion;

said ultrasound transducer further comprising:

means for removing heat generated by said at least one discrete electrical component from said interior portion to said exterior portion using a first thermal conductor means thermally coupled with said at least one electrical component.

31. The ultrasound transducer of Claim 30 further comprising:

means for removing said heat from said first thermal conductor means by a second thermal conductor means located proximate to said exterior portion and coupled with said first thermal conductor means.